

US.Pat.Apl.No:10-662,818

Docket 616-76US

Remarks
submitted July 2006

[001] This is in response to the Office Action dated 14 April 2006.

[002] AMENDMENTS

Please enter the amendments to the claims as submitted herewith.

[003] Election/Restriction

In the O/A, the PTO declined to examine process claim 12, despite the comments we presented in our Remarks filed 28 February 2006.

Claim 12 is now cancelled. However, a new process claim, claim 27, is now added. We request that claim 27 be examined along with claims 1-26.

The requirement for restriction between two claims can only stand if the two claims are independent and distinct. (New) process claim 27 depends on (amended) apparatus claim 1. In our view, the requirement for restriction cannot be applied between claim 1 and (new) claim 27, because those two claims are not independent and/or not distinct, and we request that claim 27 be examined.

[004] Information Disclosure Statement

We enclose the concise explanation of the relevance, as presently understood, of the non-English citations.

[005] Rejection of claim 1 under 35.U.S.C.102

The as-examined version of claim 1 was rejected on the grounds that there were no words in that version of claim 1 that distinguish claim 1 from the apparatus disclosed by Hiasa.

By virtue of the amendments as now presented, amended claim 1 is distinguished from the apparatus depicted in the Hiasa reference as follows.

In Hiasa, the secondary-water basically goes around the circuit in series. That is to say, Hiasa's

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ammonium-laden secondary-water passes from his zeolite column 5 into his electrolytic cell 7; there, the ammonium is oxidised (and nitrogen gas is produced, as described); then, the secondary-water goes to his pH-adjusting bath 9, and from there to his active carbon column; and finally, the now-cleaned secondary water is returned to his column 5.

Claim 1 is distinguished from the Hiasa apparatus. In amended claim 1, our apparatus is required to have two parallel, but mixed, circulations. We have an ammonium-station circulation, and we have an electrolysis-station circulation. These two circulations meet, and mix, in our intermediate tank. The two circulations can be clearly seen in our two apparatuses as depicted in Fig 1 and Fig 2 respectively of our specification.

Our two parallel circulations of secondary-water are not independent of each other, in that both pass through our intermediate tank. In the intermediate tank, the two circulations mix. They mix to the extent that, if there were a difference in the ammonium concentration between the ammonium-station circulation and the electrolysis-station circulation, those differences in concentration will be made insignificant, or eliminated, due to mixing in our intermediate tank. As shown, we might provide a mechanical stirrer, to ensure that all secondary-water residing in the tank is all at the same concentration.

The same applies to the pH of our two circulations. In other words, the pH of secondary-water emerging from our electrolysis-station will (during treatment) be different from the pH of secondary-water emerging from our ammonium station; but the pH of secondary-water entering the electrolysis station will be the same as the pH of secondary-water entering the ammonium station, because both are drawn from the mixed secondary-water in our intermediate tank.

In our Fig 1 -- which we call our ion-exchange system -- our column 3 remains off-line (i.e. no further ammonium is added to the column 3) at the time when the body of secondary-water is being circulated. Thus, the concentration of ammonium in our body of secondary-water decreases gradually as the secondary-water circulates and recirculates through the column, then through the electrolytic cell, then through the column, then through the cell, and so on again and again, many times. Thus, the level of ammonium in the column is gradually driven down to zero (that is to say: to "undetectable" -- assuming the system has been properly engineered). Then, when our column contains no more ammonium, the column can be put back on-line.

In our Fig 2 -- which we call our alkali-acid system -- our column 42 remains coupled into the ammonium-extraction station all the time. That is to say, in Fig 2, our column 42 remains on-line, feeding more ammonium into the secondary-water, while our secondary-water is circulating. Again, there are two parallel circulations, one around our ammonium-station (i.e. around the column 42), and the other around our electrolysis-station. Both circulations meet in, and are mixed together in, our intermediate tank.

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It is readily apparent, in our ion-exchange (Fig 1) system, that the circulation and recirculation of the secondary-water, i.e the constant separating and mixing of the two circulations, serves to drive our ammonium concentration progressively down to very low values. Although not quite so readily apparent, it is also true that in our alkali-acid (Fig 2) system, again the circulation and recirculation of the secondary-water, i.e the constant separating and mixing of the two circulations, also serves to drive our ammonium concentration down to very low values (although not, perhaps, as low as in our ion-exchange system). This in-parallel, separate-then-mix, circulation and recirculation arrangement is a very efficient way of driving the concentration of ammonium down, and has the other benefits as described in the specification.

Hiasa's manner of arranging the secondary-water circuit, by contrast, is rather wasteful of materials, and hence costly to run. It is not really meaningful to compare efficiencies by looking at the examples quoted in Hiasa, because of course it is always possible to remove ammonium down to whatever concentration is desired, simply by using more resources. However, it may be noted, for instance, that in our as-described systems there is no need to resort to the hugely wasteful active-carbon procedure that Hiasa suggests.

[006] It is true that it is old technology to extract ammonium from a wastewater stream by what we call our ion-exchange method. It is also true that it is old technology to extract ammonium from a wastewater stream by what we call our alkali-acid method. It is also true that the relative merits of these two technologies are known in to persons skilled in the art -- as we explained in the present specification.

However, the present invention is not so much concerned with the technology by which the ammonium is extracted out of the wastewater and put into the secondary-water. Rather, our invention concerns how the ammonium is to be taken out of solution from the secondary-water, and discharged as nitrogen gas, in an efficient and cost-effective manner.

In our invention, this extraction of the ammonium from the secondary-water is done by electrolysis. Now, Hiasa discloses electrolysis, as such, in this connection. So, our present invention can be regarded as easing some of the compromises embodied in Hiasa, thereby making the system as a whole more resource-effective.

The continual mix-then-separate-then-mix-then-separate parallel circulation system as described in our specification, and as claimed in (amended) claim 1, clearly is not disclosed in Hiasa. Clearly, also, there is no teaching in the prior art whereby the skilled person would be obviously led to make changes to Hiasa's system such as would result in a system that falls within the scope of claim 1.

Consider a skilled designer of water treatment systems, who starts from the apparatus as shown

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by Hiasa, and arrives at a new apparatus that falls within the scope of (amended) claim 1. For the above reasons, we regard such a designer, not as someone who has simply followed the teachings of the known prior art, but rather as someone who has just made an invention.

We request that the claims as now presented be indicated as allowable, on prior art grounds, for the above reasons.

[007] We note the PTO position regarding as-examined claim 5 (which is now incorporated into claim 4) as explained on page 5 of the O/A. Claim 5 stated that the electrolysis was carried out on the secondary water, at the same time as the secondary water was also being recirculated through and between the ammonium-extraction-and-transfer station. (This condition is clearly shown in the circuits of Figs 1 and 2.) The PTO view is that the apparatus of Hiasa could be operated continuously such that the electrolysis and recirculation occurred simultaneously.

In fact, the circuit of Hiasa is arranged in series. In our systems, the secondary water circulates in two parallel sub-circuits, which meet and mix at the intermediate tank. That is how the secondary water is able to go through the electrolysis station, and through the ammonium extraction and transfer station simultaneously. In Hiasa, the secondary water can only go through the various stations one after the other, in series.

We also point out that Hiasa's system must operate in **batches**, i.e. not continuously. In Hiasa, the secondary water has to pass through the carbon treatment column, before it can be returned to the ion-exchange column(s).

[008] Re Double Patenting.

In fact, the PTO having now located the papers of this present patent application, patent application 10/757,733 has been abandoned.

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Enclo:

- amended claims